CLAIMS

What is claimed is:

1. A piston comprising:

a piston body having a circumferential groove;

a first seal ring located within the circumferential groove, the first seal ring forming a dynamic seal and having a flat axially facing surface;

a second seal ring located within the circumferential groove, the second seal ring having a flat surface abutting the flat surface of the first seal ring and forming a static seal against the piston body; and

a spring located within the circumferential groove loading one of the seal rings axially against the other.

2. The piston of claim 1 wherein the second seal ring has a flange that abuts the piston body.

3. The piston of claim 2 wherein the second seal ring is an L-ring.

4. The piston of claim 3 further comprising a load ring located within the circumferential groove.

5. The piston of claim 4 wherein the spring axially loads the load ring against the first seal ring and the second seal ring.

6. The piston of claim 2 wherein the second seal ring is a flanged load ring with a flange that abuts the piston body.

7. The piston of claim 1 wherein the first seal ring and the second seal ring are polymers.

8. The piston of claim 1 wherein the piston comprises a displacer.

9. The piston of claim 1 wherein the first seal ring comprises a split seal ring.

10. The piston of claim 1 wherein the first seal ring comprises at least one radial spring mounted within the first seal ring to create a radial force within the first seal ring.

11. The piston of claim 10 where the at least one radial spring comprises a first radial spring and a second radial spring.

12. The piston of claim 11 wherein the first radial spring comprises a first opening and the second radial spring comprises a second opening wherein the first radial spring and the second radial spring are mounted within the first seal ring such that the first opening is located at approximately 180 degrees with respect to the second opening.

13. The piston of claim 1 where in the body comprises a sleeve mounted on the body, the sleeve forming a section of the circumferential groove.

14. The piston of claim 13 wherein the piston comprises a securing mechanism that secures the sleeve to the body.

15. The piston of claim 14 wherein the securing mechanism comprises a snap ring.

16. The piston of claim 1 wherein the spring is a wave spring.

17. The piston of claim 1 wherein the spring comprises a spiral wave spring.

18. The piston of claim 1 where the spring comprises at least one wavy washer.

19. A piston comprising:

a body having a circumferential groove;

a first seal ring forming a dynamic seal located within the circumferential groove, the first seal ring having a flat axially facing surface and comprising at least one radial spring mounted within a polymer split seal ring to create a radial force within the split seal ring;

a polymer L-ring forming a static seal within the circumferential groove, the L-ring having a flat surface abutting the dynamic seal and forming a static seal against the piston body;

a load ring mounted within the circumferential groove; and

a spring located within the circumferential groove, the spring loading the rings axially against the other.

20. A piston comprising:

a body having a circumferential groove;

a first seal ring forming a dynamic seal located within the circumferential groove, the first seal ring having a flat axially facing surface and comprising at least one radial spring mounted within a polymer split seal ring to create a radial force within the split seal ring;

a polymer flanged load ring having a flange that abuts the piston body and forming a static seal within the circumferential groove, the flanged load ring having a flat surface abutting the dynamic seal and forming a static seal against the piston body;

a spring located within the circumferential groove, the spring loading the rings axially against the other.

21. A refrigerator comprising:

a cylinder;

a displacer mounted within the cylinder, the displacer having a body having a circumferential groove;

a first seal ring located within the circumferential groove, the first seal ring forming a dynamic seal and having a flat axially facing surface;

an second seal ring located within the circumferential groove, the second seal ring having a flat surface abutting the flat surface of the first seal ring and forming a static seal against the piston body; and

a spring located within the circumferential groove loading one of the seal rings axially against the other.

22. A refrigerator of claim 21 wherein the second seal ring has a flange that abuts the piston body.

23. A refrigerator of claim 22 wherein the second seal ring is an L-ring.

24. The refrigerator of claim 23 further comprising a load ring located within the circumferential groove.

25. The refrigerator of claim 24 wherein the spring axially loads the load ring against the first seal ring and the second seal ring.

26. The refrigerator of claim 22 wherein the second seal ring is a flanged load ring with a flange that abuts the piston body.

27. The refrigerator of claim 21 wherein the first seal ring and the second seal ring are polymers.

28. The refrigerator of claim 21 wherein the piston comprises a displacer.

29. The refrigerator of claim 21 wherein the first seal ring comprises a split seal ring.

30. The refrigerator of claim 1 wherein the first seal ring comprises at least one radial spring mounted within the first seal ring to create a radial force within the first seal ring.

31. The refrigerator of claim 30 wherein the at least one radial spring comprises a first radial spring and a second radial spring.

32. The refrigerator of claim 31 wherein the first radial spring comprises a first opening and the second radial spring comprises a second opening wherein the first radial spring and the second radial spring are mounted within the first seal ring such that the first opening is located at approximately 180 degrees with respect to the second opening.

33. The refrigerator of claim 21 wherein the body comprises a sleeve mounted on the body, the sleeve forming a section of the circumferential groove.

34. The refrigerator of claim 33 wherein the piston comprises a securing mechanism that secures the sleeve to the body.

35. The refrigerator of claim 34 wherein the securing mechanism comprises a snap ring.

36. The refrigerator of claim 21 wherein the spring is wave spring.

37. The refrigerator of claim 21 wherein the spring comprises a spiral wave spring.

38. The refrigerator of claim 21 wherein the spring comprises at least one wavy washer.

39. A refrigerator comprising:

a cylinder;

a displacer mounted within the cylinder, the displacer having a body having a circumferential groove;

a first seal ring forming a dynamic seal located within the circumferential groove, the first seal ring having a flat axially facing surface and comprising at least one radial spring mounted within a polymer split seal ring to create a radial force within the split seal ring;

a polymer L-ring forming a static seal within the circumferential groove, the L-ring having a flat surface abutting the dynamic seal and forming a static seal against the piston body;

a load ring located within the circumferential groove; and

a spring located within the circumferential groove, the spring loading the rings axially against each other.

40. A refrigerator comprising:

a cylinder;

a displacer mounted within the cylinder, the displacer having a body having a circumferential groove;

a first seal ring forming a dynamic seal located within the circumferential groove, the first seal ring having a flat axially facing surface and comprising at

least one radial spring mounted within a polymer split seal ring to create a radial force within the split seal ring;

a polymer flanged load ring having a flange that abuts the piston body and forming a static seal within the circumferential groove, the flanged load ring having a flat surface abutting the dynamic seal and forming a static seal against the piston body;

a spring located within the circumferential groove, the spring loading the rings axially against each other.

41. A method for securing a seal ring within a piston comprising:

providing a piston having a body having a circumferential groove and a sleeve mounted on the body;

providing a dynamic seal ring against the first groove wall of the piston, the seal ring having a flat axially facing surface;

providing a static seal ring within the circumferential groove, the static seal ring having a flat surface abutting the flat surface of the first seal ring and forming a static seal against the piston body;

providing a spring within the circumferential groove;

compressing the spring with a sleeve to axially load the static seal against the dynamic seal ring; and

attaching the sleeve to the body to maintain the compression of the spring.

42. The method of claim 41 wherein the static seal ring is an L-ring.

43. The method of claim 42 further comprising providing a load ring between the L-ring and the spring.

44. The method of claim 41 wherein the static seal ring is a flanged load ring having a flange that abuts the piston body.

45. The method of claim 41 wherein the dynamic seal ring and the static seal ring are polymers.

46. The method of claim 41 wherein the dynamic seal ring is a split seal ring.

47. The method of claim 41 further comprising providing at least one radial spring within the dynamic seal ring.

48. The method of claim 41 further comprising providing a securing mechanism to attach the sleeve to the body.

49. A method for securing a seal ring within a piston comprising:

providing a piston having a body having a circumferential groove and a sleeve mounted on the body;

providing a dynamic polymer seal ring against the first groove wall of the piston, the dynamic seal ring having a flat axially facing surface and comprising at least one radial spring mounted within a polymer split seal ring to create a radial force within the split seal ring;

providing a static polymer seal ring within the circumferential groove, the static seal ring having a flat surface abutting the flat surface of the dynamic polymer seal ring and forming a static seal against the piston body;

providing a spring within the circumferential groove;

compressing the spring with a sleeve to axially load the static seal against the dynamic seal ring; and

attaching the sleeve to the body to maintain the compression of the spring.

50. A method for securing a seal ring within a piston comprising:

providing a piston having a body having a circumferential groove and a sleeve mounted on the body;

providing a dynamic polymer seal ring against the first groove wall of the piston, the dynamic seal ring having a flat axially facing surface and comprising at least one radial spring mounted within a polymer split seal ring to create a radial force within the split seal ring;

providing a static polymer flanged load ring having a flange that abuts the piston body within the circumferential groove, the flanged load ring having a flat surface abutting the flat surface of the dynamic seal ring and forming a static seal against the piston body;

providing a spring within the circumferential groove;

compressing the spring with a sleeve to axially load the static seal against the dynamic seal ring; and

attaching the sleeve to the body to maintain the compression of the spring.